ISD Project Planning Process

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Responsible Office: 580/Information Systems Division (ISD)
Title: Project Planning

Asset Type: Process
PAL Number: 1.2

Purpose

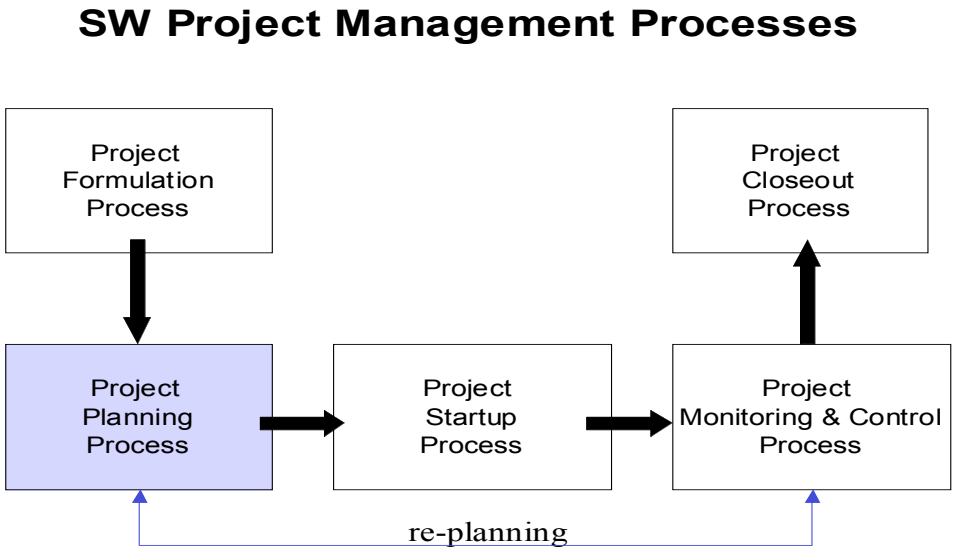
The purpose of project planning is to define an approach, and produce a plan, for conducting and managing a software development or maintenance effort. This includes

- Defining the scope of the software project
- Establishing the project's goals and objectives
- Developing estimates of cost and schedule
- Identifying the necessary resources and personnel
- Setting up a mechanism for tracking progress, schedules, and costs
- Identifying project risks and laying the foundation for risk mitigation
- Developing and baselining a Software Management Plan/Product Plan (SMP/PP)

Scope

This process is to be followed on all Information Systems Division (ISD) software projects. Such projects may or may not be part of a larger, mission-level Project.

Context



Roles and Responsibilities

Product Development Lead (PDL):
- Executes this project planning process. (NOTE: On some projects, the Software Manager or Systems Manager may also function as the PDL.)

Development Team Lead(s) (DTL):
- Supports the PDL in executing this process.

Division Chief:
- May provide input to the SMP/PP.
- May approve the SMP/PP.
- May use the Plan to track the progress of the work.

Branch Head:
- May provide input to the SMP/PP.
- Approves the Plan.
- Uses the Plan to track the progress of the work.

Project/Mission Manager:
- May provide input to the SMP/PP.
- Approves the Plan.
- Uses the Plan to track the progress of the work.

Inputs

Inputs to this process are:
- Requirements document(s)

OR
- Statement of customer needs

GUIDANCE: Typically, requirements consist of:
- *System or subsystem requirements document*
- *Software requirements document*
- *Interface Requirements/Control Documents*
- *Mission Assurance Requirements (if applicable)*

Requirements may be supplied to the project externally or developed through project activities. Requirements documents that are input to project planning may be in draft form.

If requirements documents are unavailable, project planning can begin when the customer's or user's needs have been documented. A statement of customer needs is usually in the form of a Memorandum of Agreement (or Understanding), a contract, or Statement of Work.

Entry Scenarios

This process is entered at the initiation of a software development or maintenance project. It is also entered whenever a project must be re-planned.

GUIDANCE: Re-planning may be performed as a corrective measure, the need for which is determined during Project Monitoring & Control. Criteria that often trigger re-planning include:

Entry Scenarios (continued)

- *Significant changes in scope, schedule, or budget*
- *Delay in receipt of key component or service that is externally supplied*
- *Inability to meet a major milestone*

When only very high-level requirements (e.g., an approved research proposal) are available for initial planning, a project may be re-planned iteratively as requirements, constraints and resources are defined.

Entry Criteria

- The role of **Product Development Lead (PDL)** for the project must be filled
- A list of requirements or a statement of the customer's/user's needs must be available

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Exit Criteria

- The Software Management Plan/Product Plan (SMP/PP) and subsidiary plans have been reviewed, approved, and distributed to stakeholders.

OR

- The updated SMP/PP has been reviewed, approved and distributed.

Outputs

The outputs of this process are:

- The baselined SMP/PP and its subsidiary plans
- The plan for tracking the progress and cost of work elements

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Major Tasks

The **PDL, with support from the DTL as indicated,** shall perform Tasks 1 through 10 sequentially, iteratively, or in parallel. The **PDL** shall perform Task 11 as required.

1. Identify software deliverables and external dependencies.
2. Identify the development and/or acquisition strategy and corresponding processes.
3. Estimate product size and project effort, schedule, and cost.
4. Select and tailor the life-cycle model(s) for the project.
5. Identify personnel and other resources needed; produce an organization chart.
6. Develop and document a data management strategy.
7. Develop and document a stakeholder involvement strategy.
8. Identify risks and risk mitigation strategies, and prepare a Risk Management Plan.
9. Produce a preliminary Work Breakdown Structure (WBS), earned value spreadsheet, and build/release plan.
10. Write and baseline the Software Management Plan /Product Plan (SMP/PP).
11. Modify the SMP/PP as needed.

Task 1

Identify software deliverables and external dependencies. [PDL, DTL]

a) Analyze deliverable requirements or user needs to identify what software and documentation must be delivered. *GUIDANCE: Assess and consider the maturity / fidelity of the software requirements. This assessment will help determine the need to acquire further detail later in the planning process, the fidelity of the current plan/estimate, the level of risk associated with the plan, and how often the plan may need to be updated.*

b) Identify any external dependencies, such as schedules or resources. Determine the answers to the following questions:

- When must the software be delivered?
- Is development or delivery dependent on any other project, organization, or existing system?
- Are there higher-level milestones that will drive the schedule (e.g., Project-level reviews, release, and/or launch dates)?

Task 2 **Identify the development and/or acquisition strategy and corresponding processes. [PDL, DTL]**

a) Determine whether the software to be delivered will be developed or whether all or part of the software will be acquired. *GUIDANCE: "Make or buy" decisions for major system components are usually made by the System Engineer/Architect as part of the process of defining system, software & operations concepts. See Software Acquisition Planning Process.*
b) If the software is to be developed, determine if existing software components can be reused.
c) If software will be acquired, determine whether it can be purchased as COTS or obtained as GOTS.
d) Determine whether extensive prototyping, performance modeling, and/or simulation activities will be necessary to derive detailed requirements or reduce risks.
e) Meet with the designated Software Assurance (SA) representative to determine which quality assurance and configuration management activities will be conducted on the project. *GUIDANCE: If a Code 300 SA representative has not been designated for the project, assign the SA role to a project member.*
f) Identify the set of standard processes, procedures, templates, tools, et al. that will be used, as well as any waivers that will be required.

Task 3 **Estimate product size and project effort, schedule, and cost. [PDL, DTL]**

Follow established guidelines for software estimation. *GUIDANCE: See ISD Software Project Estimation.*

Task 4 **Select and tailor the life-cycle model(s) for the project. [PDL, DTL]**

Determine the type of life cycle(s) most appropriate for the project, what phases will be included, what reviews conducted, etc. *GUIDANCE: See Guidelines for Selecting & Tailoring a Life Cycle.*

Task 5 **Identify personnel and other resources needed; produce an organization chart. [PDL]**

a) Identify the project roles that need to be filled. Determine the number of staff needed in each role. *GUIDANCE: Plan to fill key roles early, and provide for retention of a cadre of experienced developers and test personnel through delivery and operations.*
b) Determine what additional resources are required, such as hardware, tools, training, or travel.
c) Produce an organization chart for the project.
d) Identify points-of-contact on both sides of any organizational interfaces.

Task 6 **Develop and document a data management strategy. [PDL]**

a) Identify and document the project records that need to be retained.
b) For each type of record, determine how and where each will be retained, who will be responsible for providing and retaining each, and when/how often the records will be captured. *GUIDANCE: Consider using a spreadsheet or similar*

mechanism to document this information. See the ISD Guidance on Data Management and Process Configuration Management.

Task 7 **Develop and document a stakeholder involvement strategy. [PDL]**

a) Identify and document the external and internal (i.e., within the PDT) organizations, teams, groups, and/or individuals involved in developing, verifying, validating, or using the project's interim and final products.
b) Describe the purpose and rationale for each stakeholder's involvement, its importance to the project, and the authority and responsibility of each stakeholder.
c) Describe how stakeholder involvement will be monitored and documented.
d) Identify any additional project effort or materials needed to ensure that stakeholders become and remain involved.

GUIDANCE: Consider using a stakeholder matrix to document each stakeholder against the activities in which the stakeholder is involved. See ISD Software Management Plan/Product Plan (SMP/PP) For Class B & C Software.

Task 8 **Identify risks and risk mitigation strategies, and prepare a Risk Management Plan. [PDL]**

a) Determine the probability (qualitative or quantitative) that the project will experience one or more undesirable events, such as a cost overrun, schedule slippage, or technical failure.
b) Determine the consequences or impact of each event if it were to occur.
c) Identify actions and countermeasures that could be taken to avoid and/or reduce the impact of each risk.
d) Document all risks and risk mitigation strategies in a Risk Management Plan.

GUIDANCE: See the ISD Software Risk Identification Process for additional information.

Task 9 **Produce preliminary Work Breakdown Structure (WBS), earned value spreadsheet, and build/release plan. [PDL, DTL]**

a) Identify the types of work that will be performed. Group related work elements together into a set of categories that can be used to track project progress and cost. *GUIDANCE: Categories can reflect stages of the project's life cycle or the structure of the product to be delivered (e.g., subsystem X development, subsystem Y development, management).* Document this Work Breakdown Structure.
b) Prepare a plan for tracking the progress and cost of the individual work elements in each WBS category. Use an approved method such as Earned Value (EV).
c) Develop a preliminary schedule for staging the development, testing, and release of each major software component. Document this schedule in a build/release plan.

GUIDANCE: For additional guidance, see the following:

- *Guidelines for the WBS*
- *EV Tool & Instructions.*
- *Build Planning Guidelines*

Task 10 **Write and baseline the Software Management Plan / Product Plan (SMP/PP).**

[PDL]

a) Depending on the criticality and/or size of the project, as well as the development process to be used (see Task 2), determine which subsidiary plans must be developed in conjunction with the SMP/PP.

GUIDANCE: Subsidiary plans may be included within the SMP/PP, attached as appendices, or packaged and baselined as separate documents. Examples of subsidiary plans include the following:

- *Quality Assurance Plan*
- *Configuration Management Plan*
- *Risk Management Plan*
- *Security Plan*
- *Safety Plan*
- *Build/Product Release Plan*
- *Technology Transfer Plan*
- *Training Plans*

b) Use the appropriate *Software Management Plan/Product Plan Template* to ensure the plan is complete and consistent with standards.

c) Adjust the content of the SMP/PP to reflect the project's specific needs.

d) Review the SMP/PP for consistency with all subsidiary plans. Adjust the SMP/PP and/or subsidiary plans as necessary to ensure consistency across all project plans.

e) To help secure buy-in prior to formal management review, distribute the draft SMP/PP and subsidiary plans to affected stakeholders, including members of the development/maintenance team. Modify the draft to address stakeholder concerns.

f) Submit the SMP/PP and subsidiary plans to appropriate line and project managers (e.g., Branch Head and Project/Mission Manager) for their approval. Management approval establishes the feasibility of the plan and secures a commitment to provide the required staffing, facilities, and other resources.

g) Establish the approved SMP/PP and subsidiary plans as a baseline, and maintain configuration control over the documents.

Task 11

Modify the Software Management Plan/ Product Plan (SMP/PP) as needed. [PDL]

a) Periodically revisit the SMP/PP (e.g., at major milestones, at the end of each life cycle phase) to determine whether any changes to it or its subsidiary plans are needed.

b) If the project is determined to be significantly out-of-plan, or when external events change the basis for the plan, revise the SMP/PP and any subsidiary plans that have been affected.

c) Establish a new baseline. Continue to maintain careful change control over all updated plans.

Measures

Recommended Measures:

- Record hours spent in project planning, including preparation of the SMP/PP and subsidiary plans.

Required Measures: None

Tools and Templates

- Process Assets Library at http://software.gsfc.nasa.gov/process.cfm
- *EV Tool & Instructions*.

Training

The training courses listed below provide the information and skills necessary for successful project planning:

Course Title	Description
Project Planning	Software project planning
Earned Value (Progress Tracking with Earned Value or Point Counting)	Understanding and applying earned value to track progress, schedule, and effort/cost
Mission Software Risk Management	Identifying project risks and planning risk mitigation strategies

References

This process is consistent with the following policies, standards & references.

- **Glossary:** http://software.gsfc.nasa.gov/glossary.cfm
  Defines common terms used in ISD processes.
- **ETVX Diagram:** A hyper-link to this diagram can be found in the Process Asset Library on-line version of this document.
- **Process Asset Library:** http://software.gsfc.nasa.gov/process.cfm
  Library of all ISD process descriptions.

Quality Management System Records

Controlled Document / Description	Record Custodian
Software Management Plan/Product Plan (SMP/PP), including subsidiary plans. Signed and dated by the Branch Head, Software Manager, and Customer. ISD CCB approval is only required if the plan is not subject to Project CM.	Software Manager

Change History

Version	Date	Description of Improvements
1.0	04/28/04	Initial approved version by CCB
1.1	08/10/05	Revision 1 – revised to add new tasks for planning data management and stakeholder involvement strategies. Also added an activity in Task 9 to ensure that the SMP/PP and its subsidiary plans are reviewed for consistency before being finalized. Changed all references to the "Software Management Plan (SMP) or Product Plan" and "SMP/Product Plan" to be SMP/PP and updated to match the current process template. (D. Szakal)